



# **BERGES**

## **Operating Instructions**

**Braking Chopper BC 200**







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# 1 Installation and Operating Instructions for the Braking Chopper BC 200

## 1.1 Introduction

This Manual contains instructions on installing and operating the BC 200 (Order number: 34001244; enclosure IP 21). The braking chopper is suitable for operation in conjunction with frequency converters of Type Series ACP 6000 and UD 7000 and for universal use in conjunction with power systems with a voltage between 380 and 460 V AC.

## 1.2 Type Series

The braking chopper BC 200 supplements the equipment's own braking choppers and braking resistors.

Device assignment (recommended)	ACP 6005-5 to 6022-0	ACP 6030-0 to 6055-0	UD 7030–7160
Braking chopper Order No.	BC 200 (200 A) 34001244		
BC resistor, Type Order No.	RBKK20 – IP 54 34001161B <b>or</b> RBK20 – IP 21 34001048	2 × RBKK20 – IP 54 34001161B <b>or</b> 2 × RBK20 – IP 21 34001048	RBKK20 – IP 54 <sup>(1)</sup> 34001161B <b>or</b> RBK20 – IP 21 <sup>(1)</sup> 34001048

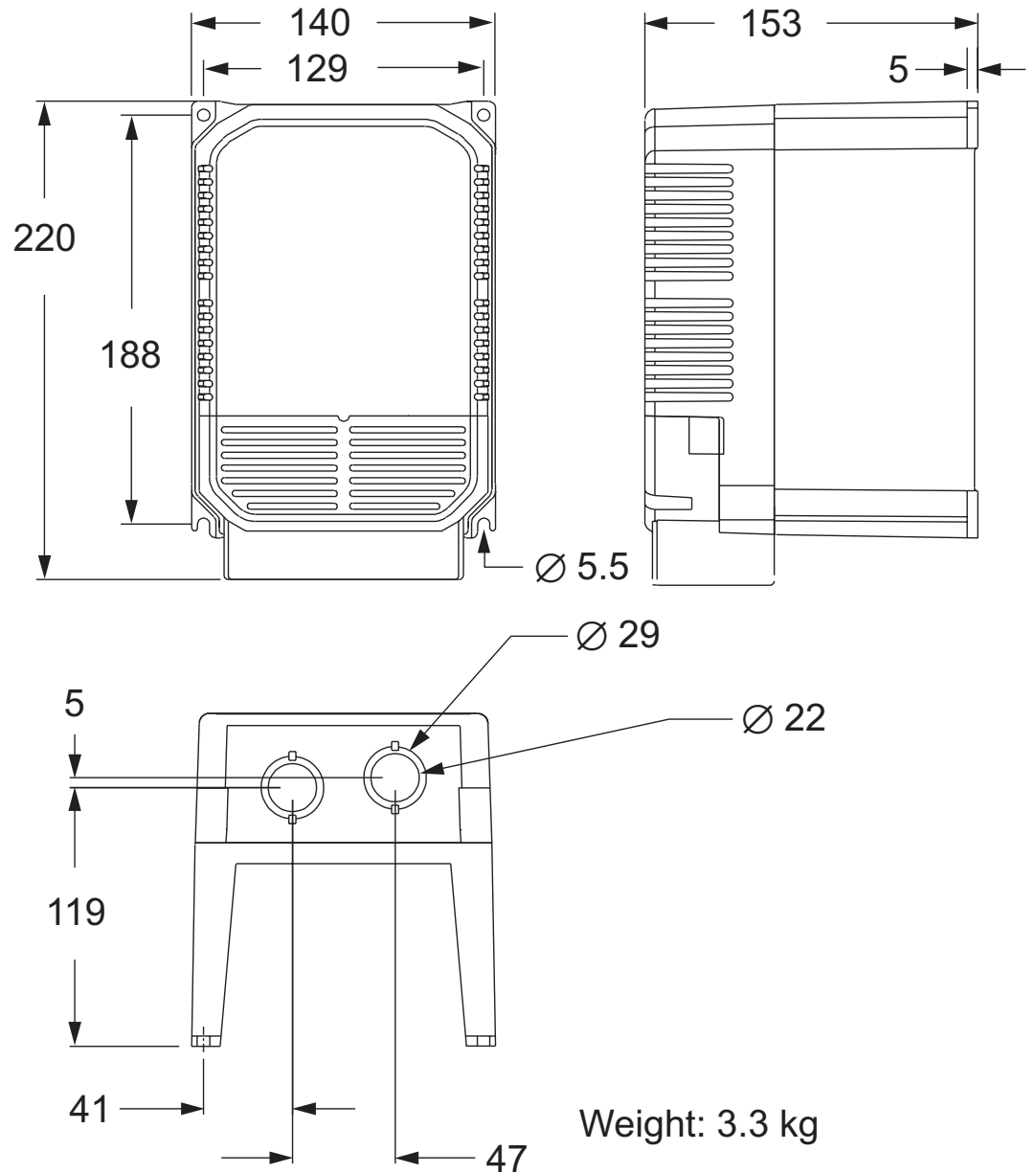
### NOTES:

Please use Chapters 1.5–1.9 as a configuration aid. We recommend that you contact BERGES in the case of extreme applications.

- (1) RBKK20 – IP 54 **or** RBK20 – IP21 can be connected as required in parallel with an overall resistance of up to 5 Ohm.

## 1.3 Technical Data

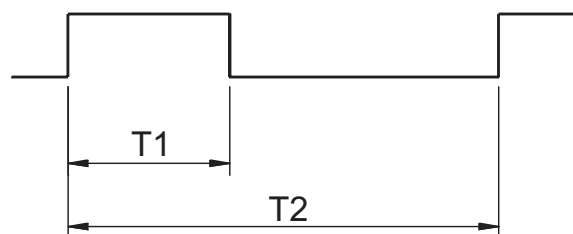
Continuous current	30 A
Operating voltage (range)	300 VDC–800 VDC
Response threshold	700–760 VDC
Power supply, fan	24 VDC/1 A (suitable for 2 RBKK20s – IP 54).
Ambient temperature	0–50 °C.
Enclosure	IP 21.
Signalling contact	220 VAC/0,3 A; 24 VDC/2 A.
Dimensions and weights	See the illustration below.
Installation instructions	Cable length between frequency converter and BC <b>maximum 5 m and twisted</b> ; an additional capacitor bank (which can retrofitted as an option) is necessary in the case of a cable length exceeding 5 m. Cable length between BC and braking resistor <b>maximum 5 m twisted</b> .



#### 1.4 Description of the Maximum Duty Cycle <sup>(1)</sup>

If the energy to be braked is greater than the braking resistor can absorb, the maximum permitted temperature will be exceeded. This is followed by the cooling phase. This On/Off ratio is shown in the sketch below:

Maximum duty cycle



Braking time (min.) = T1  
Overall cycle time (min.) = T2

(1) Only IP 54 braking resistor with separately driven fan.

The following formula can be used in order to ensure that the temperature limits are not reached:

$$\text{Duty cycle in percent} = \frac{\text{Braking time (min.) } T1}{\text{Overall cycle time (min.) } T2} \times 100\%$$

The value thus calculated **must be less** than the maximum duty cycle value.

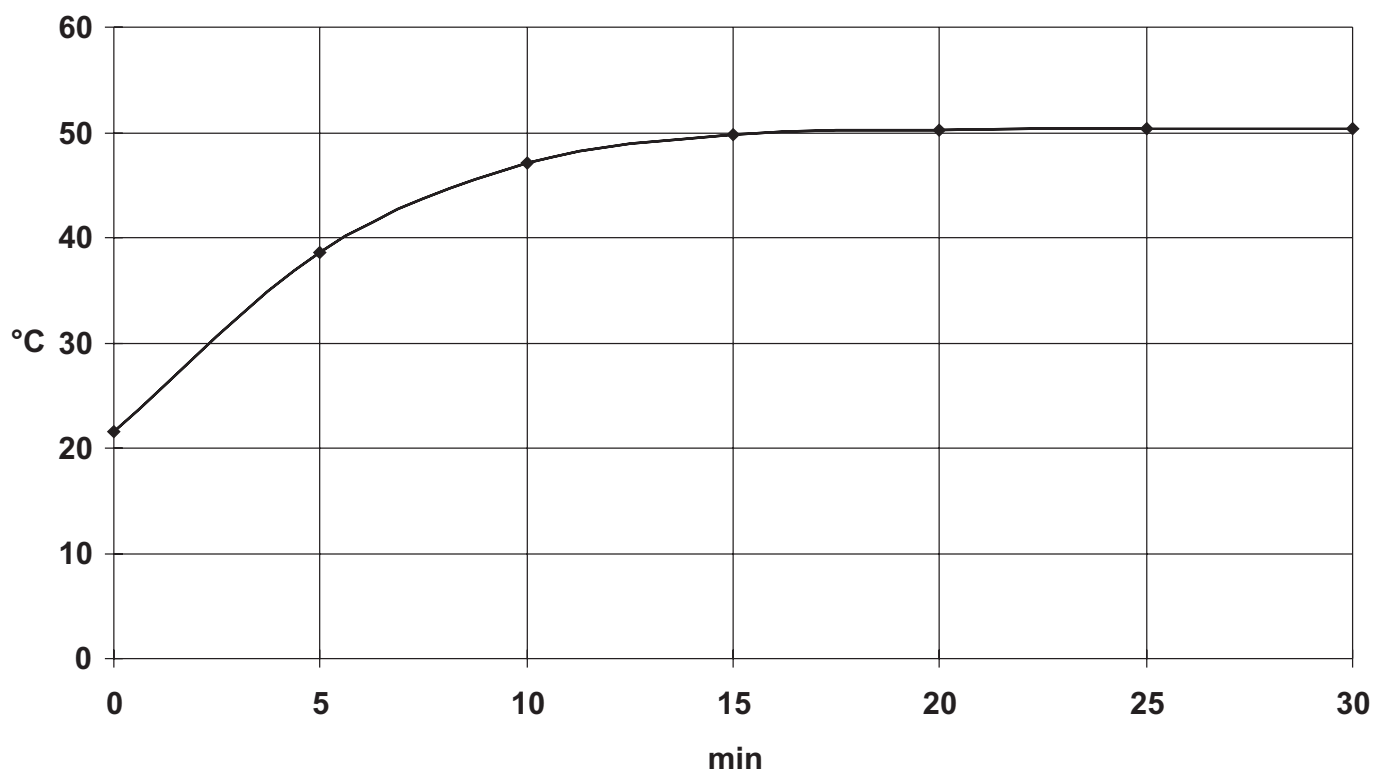
If the specified data of the maximum duty cycle or of the maximum braking time of a braking chopper unit does not suffice, it is possible to connect two units in parallel (only with works approval).

The diagrams on the pages which follow show the temperature development of the individual braking chopper power categories.

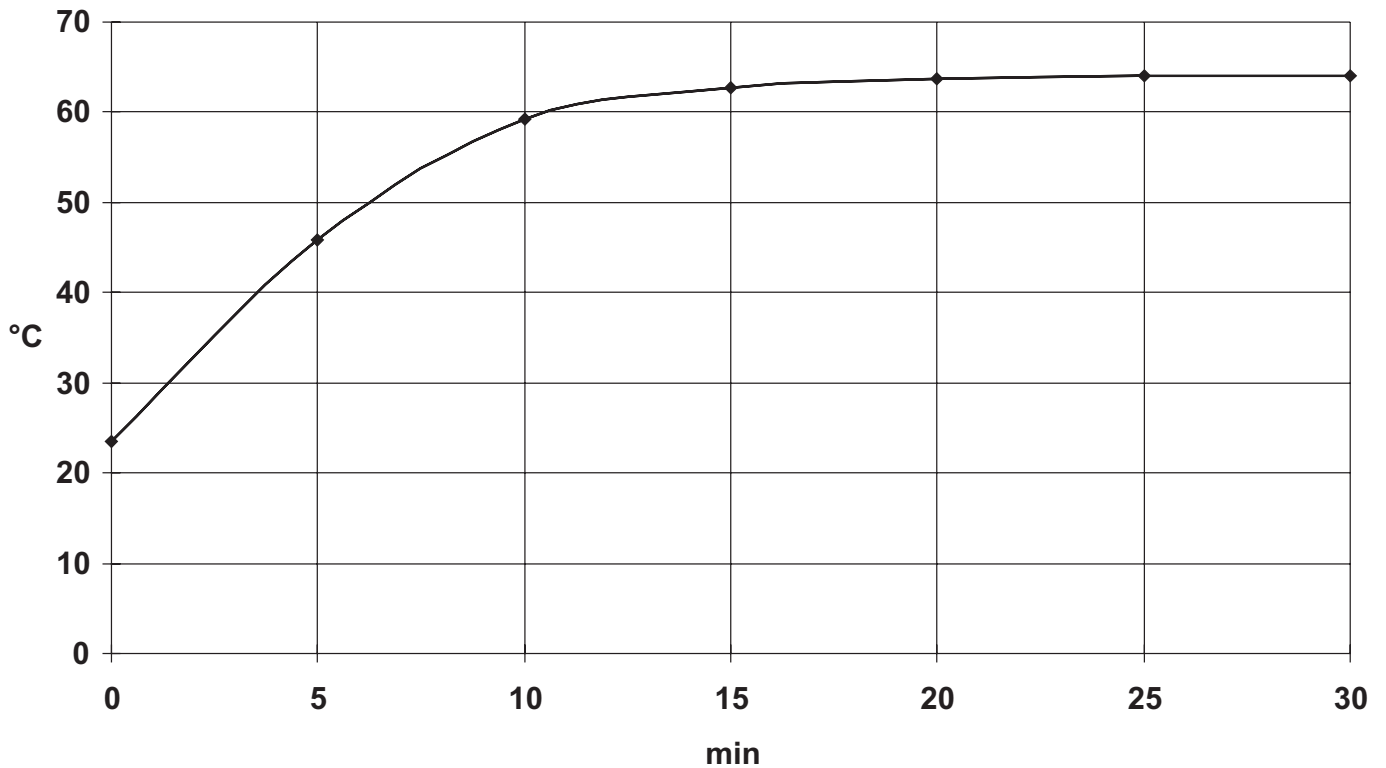
**NOTE:**

Using the IP 21 braking resistors without separate cooling results in approx. 30% braking power of the IP 54 version.

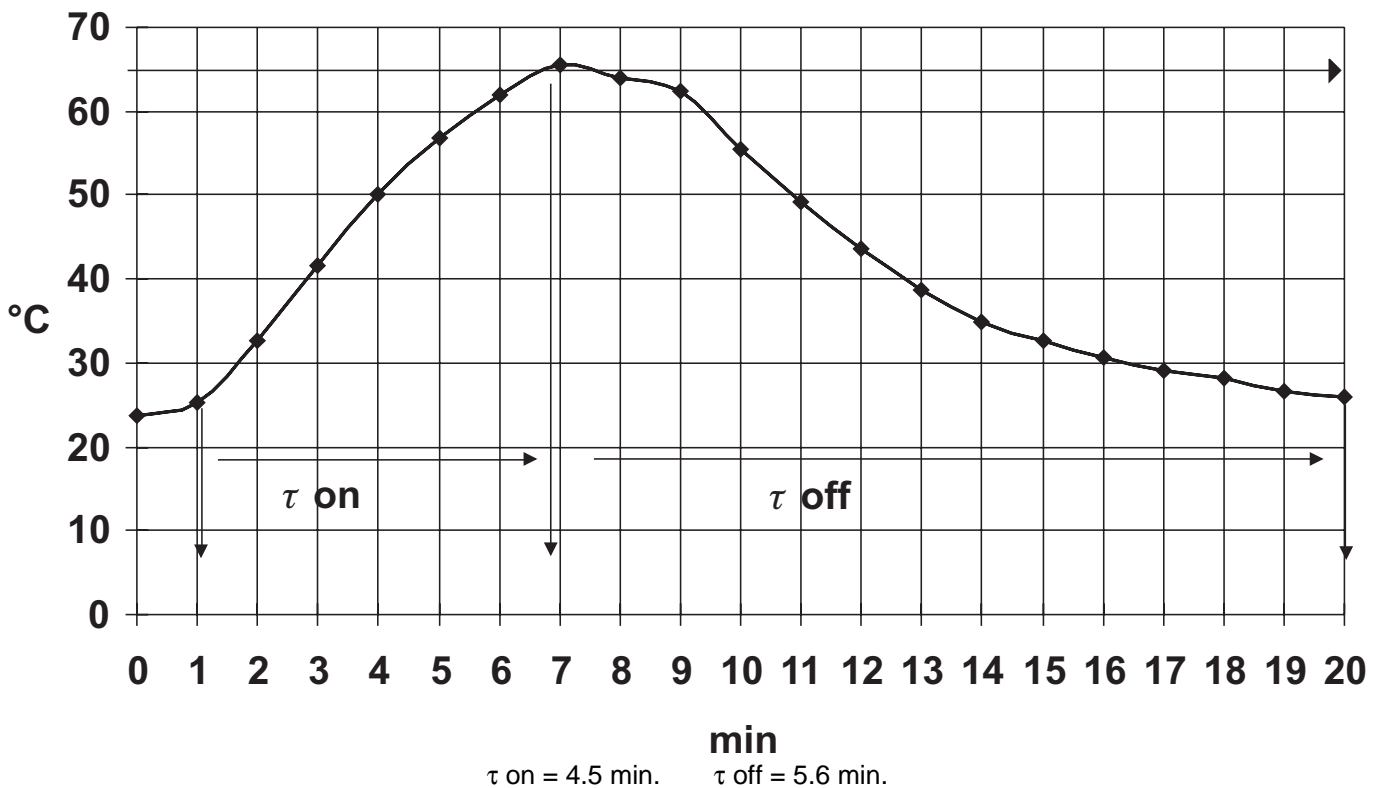
### 1.5 Determining the Braking Time with 20 Ω Braking Resistor and 5.5 kW Drive Power



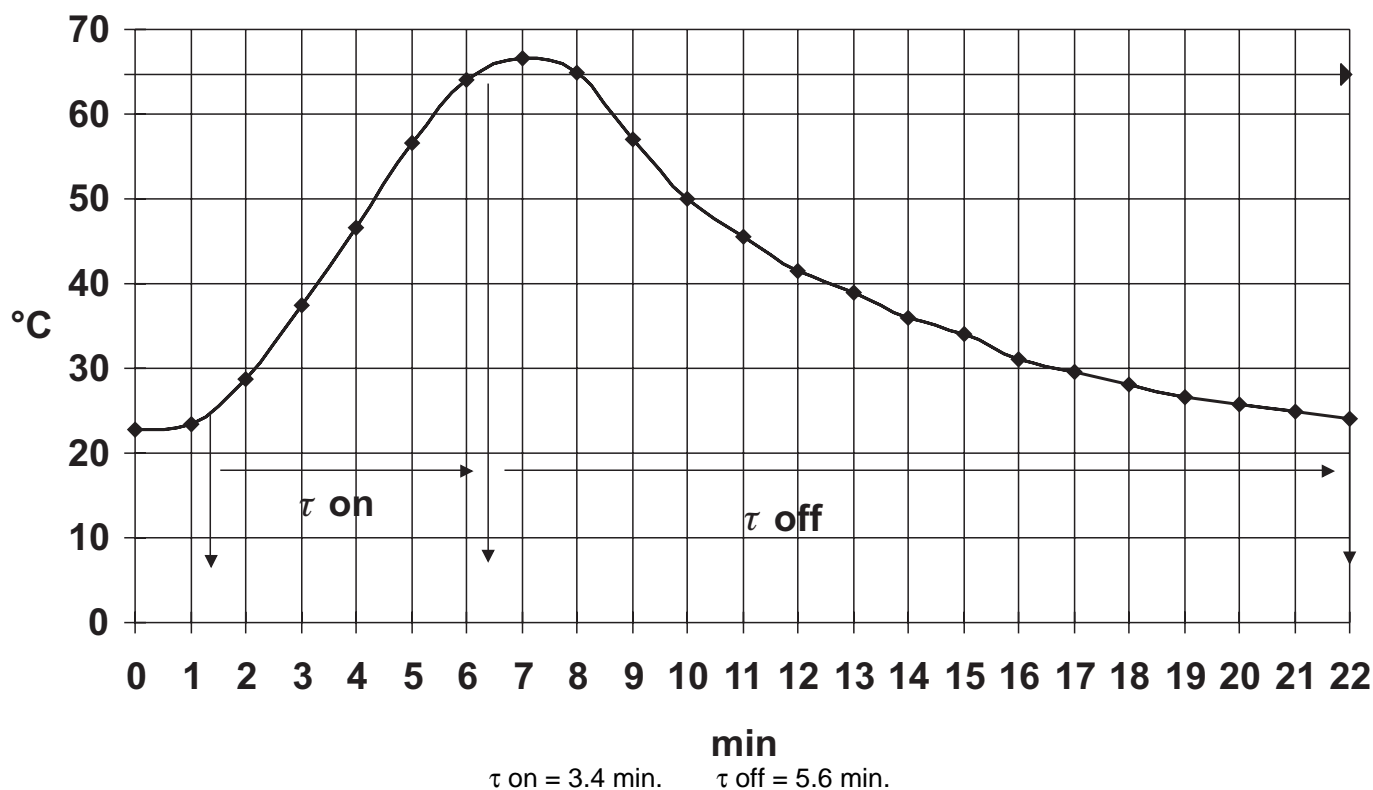
### 1.6 Determining the Braking Time with 20 $\Omega$ Braking Resistor and 7.5 kW Drive Power



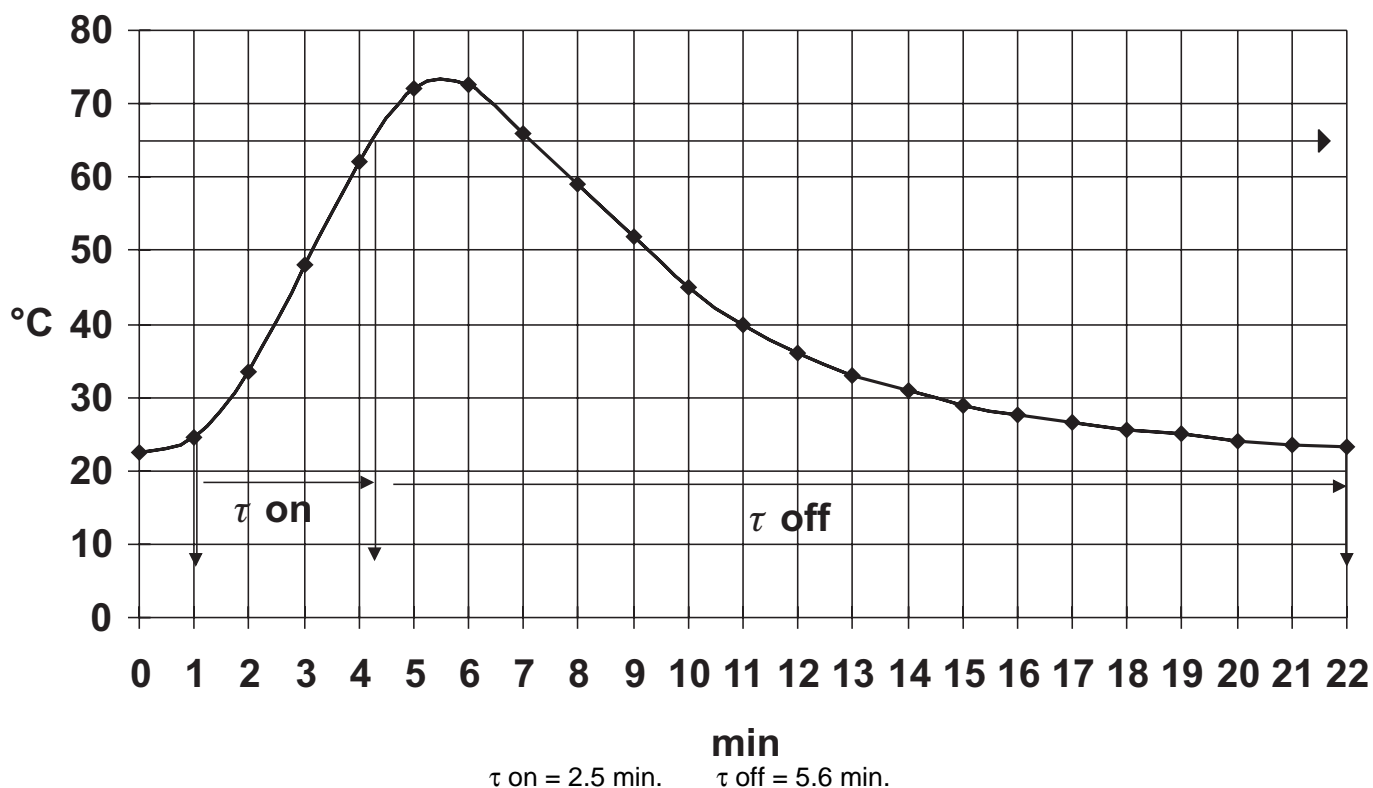
### 1.7 Determining the Braking Time with 20 $\Omega$ Braking Resistor and 11 kW Drive Power



### 1.8 Determining the Braking Time with 20 $\Omega$ Braking Resistor and 15 kW Drive Power



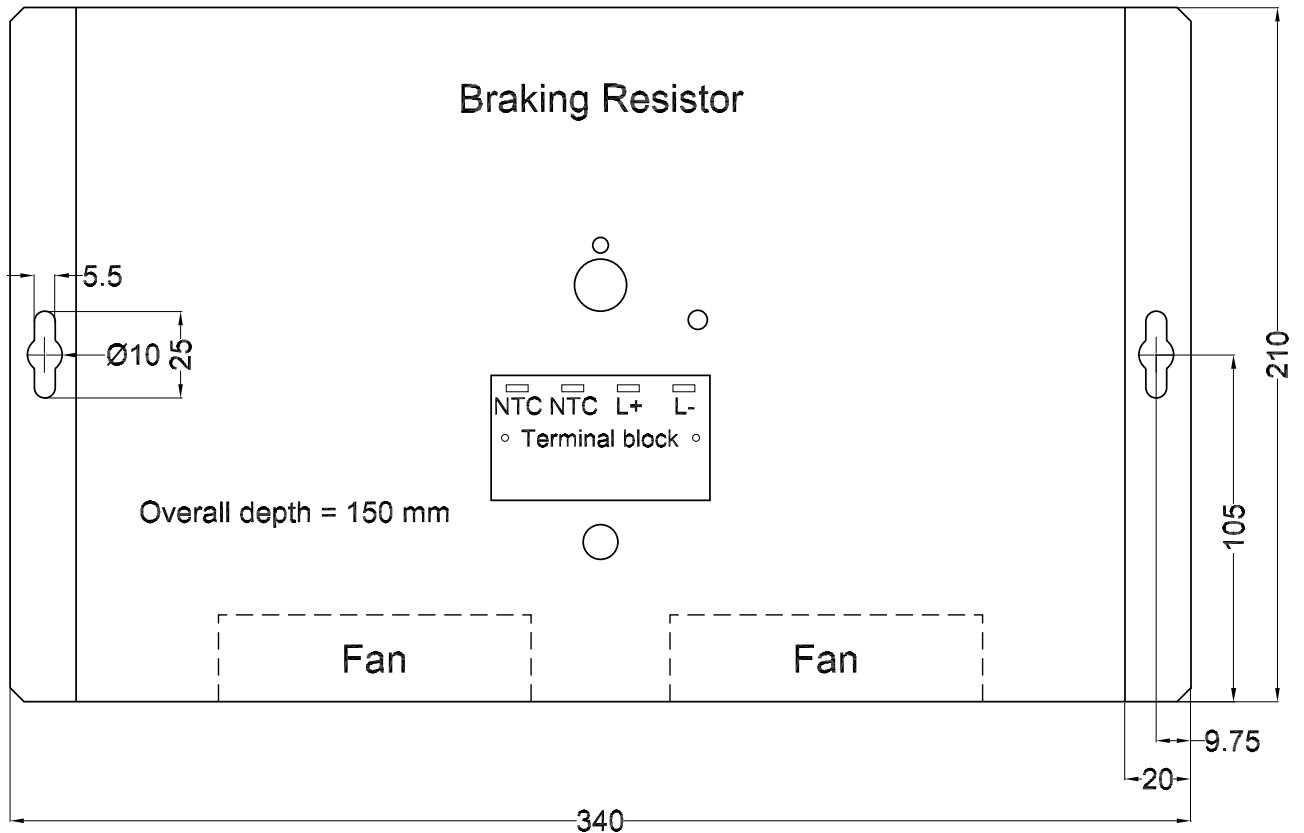
### 1.9 Determining the Braking Time with 20 $\Omega$ Braking Resistor and 22 kW Drive Power





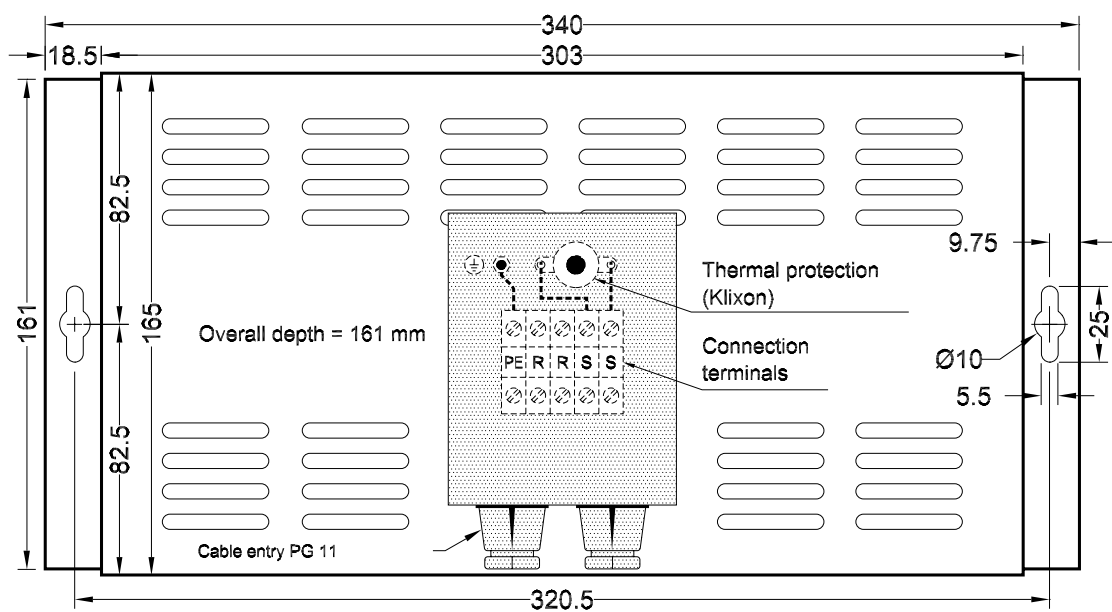
## 2 Installation and Wiring

### 2.1 Housing Drawing, Braking Resistor RBKK20 (IP 54)



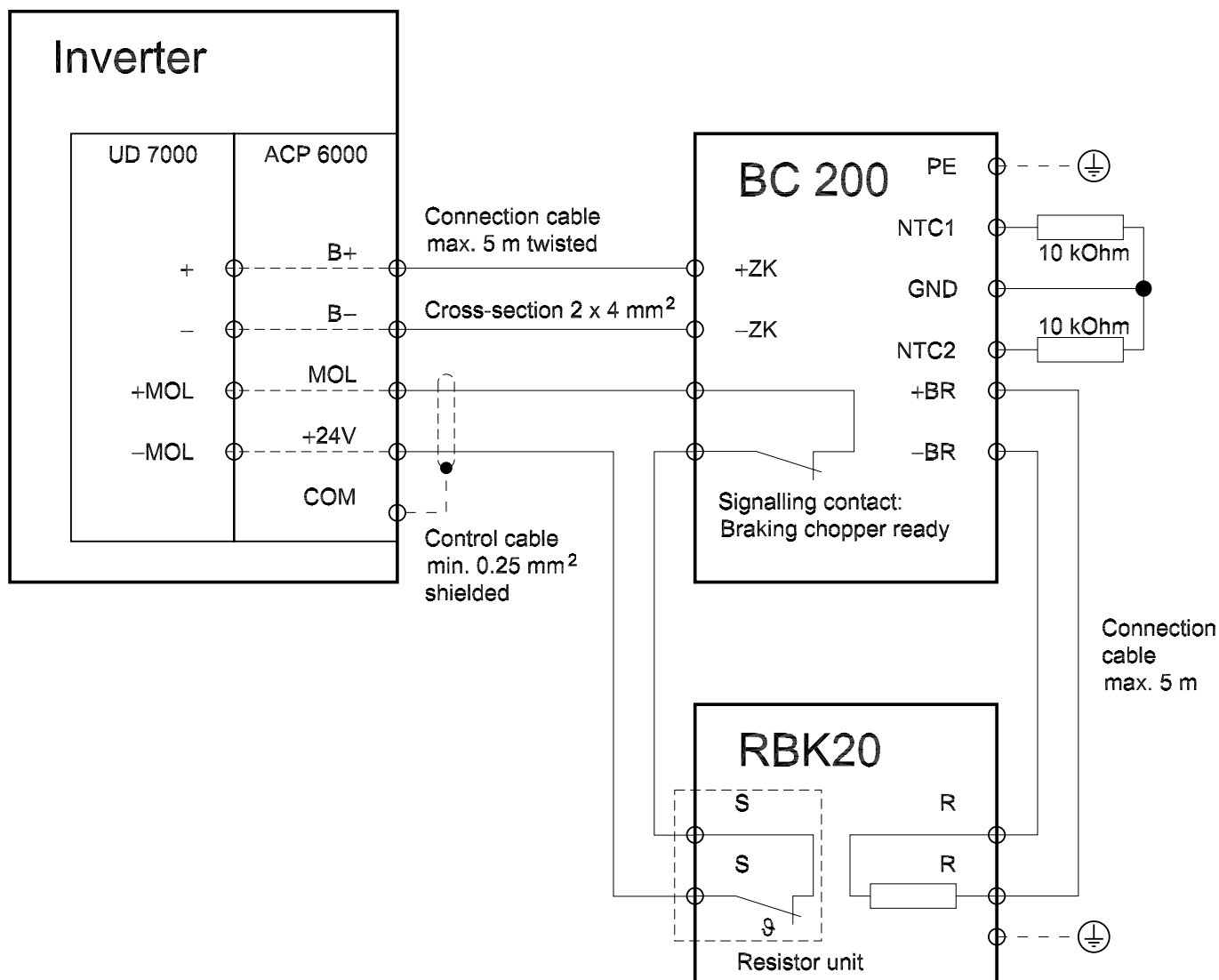
Braking resistor RBKK20 – IP 54 (Order No.: 34001161B)

### 2.2 Housing Drawing, Braking Resistor RBK20 (IP 21)



Braking resistor RBK20 – IP 21 (Order No.: 34001048)

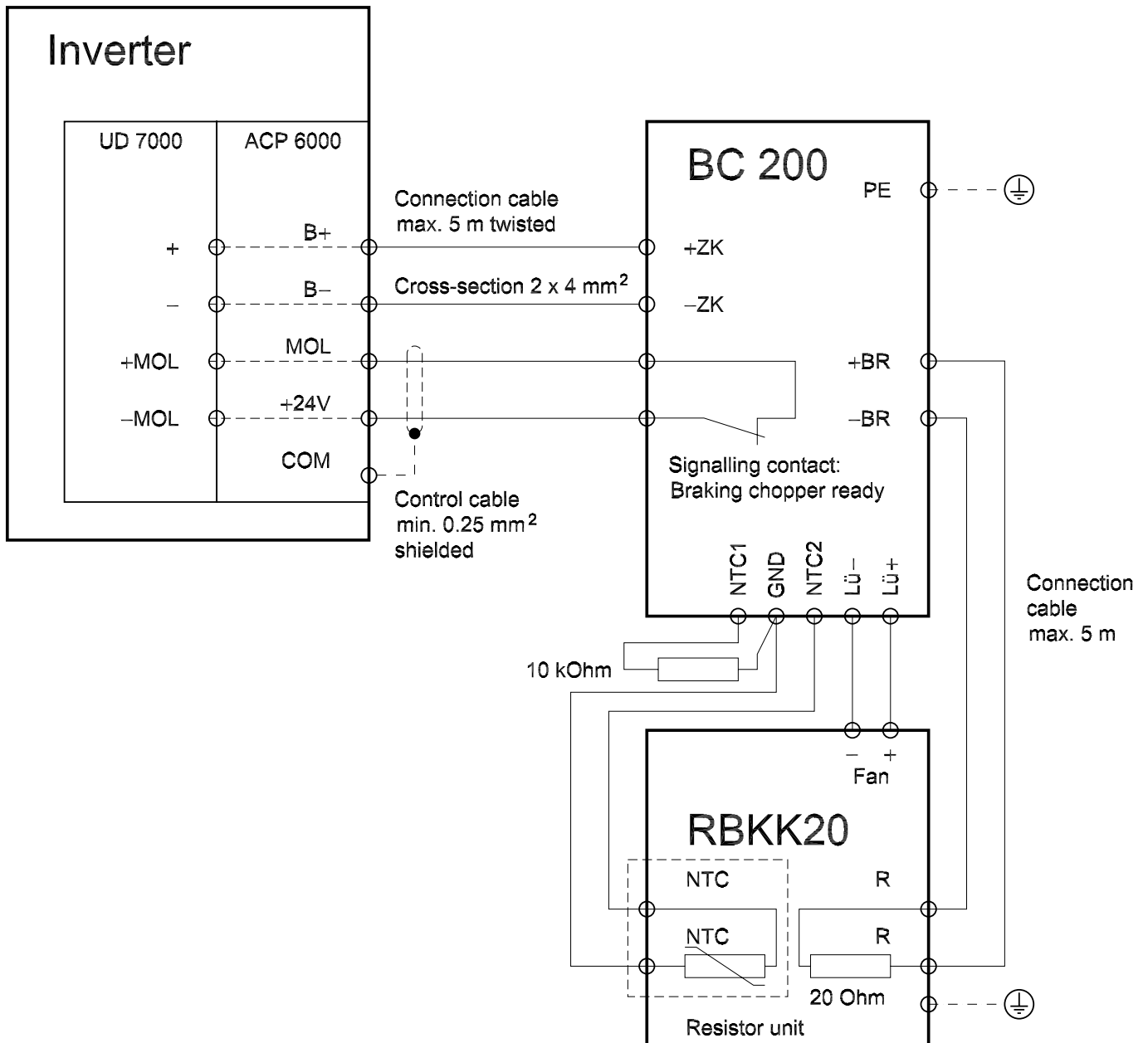
## 2.3 Connection of the Braking Resistors



Wiring with braking resistor RBK20

### ATTENTION!

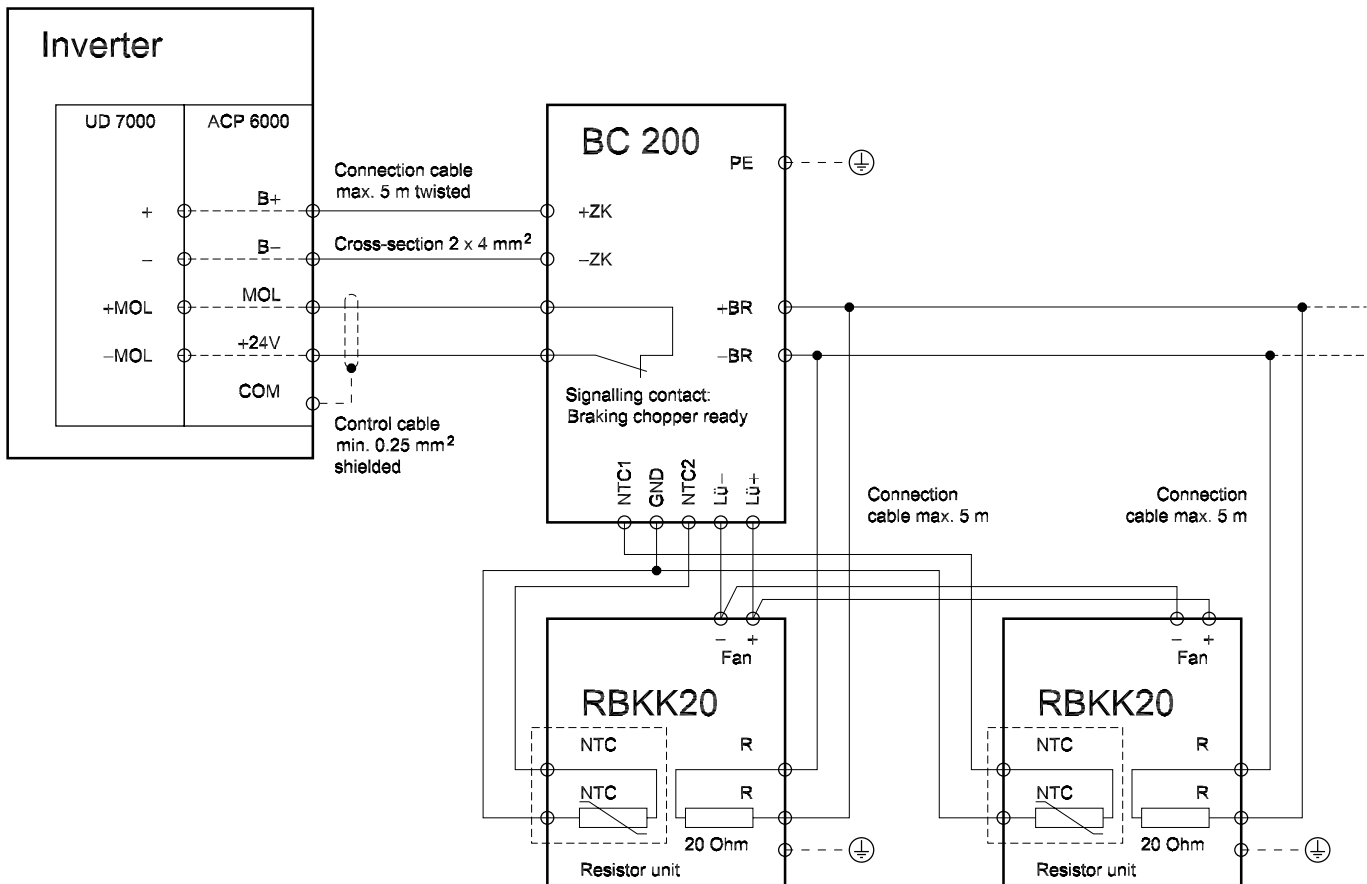
Wire the connection terminals for the thermal protection (Clixon) so that the mains voltage is disconnected if the braking resistor overheats.



#### Wiring with braking resistor RBKK20

#### ATTENTION!

Wire the connection terminals for thermal protection (NTC) to the BC 200 so that the mains voltage is disconnected in the event of overheating of the braking resistor (use the signalling contact of the BC 200 for this).



#### Wiring with 2 braking resistors RBKK20 in a parallel circuit

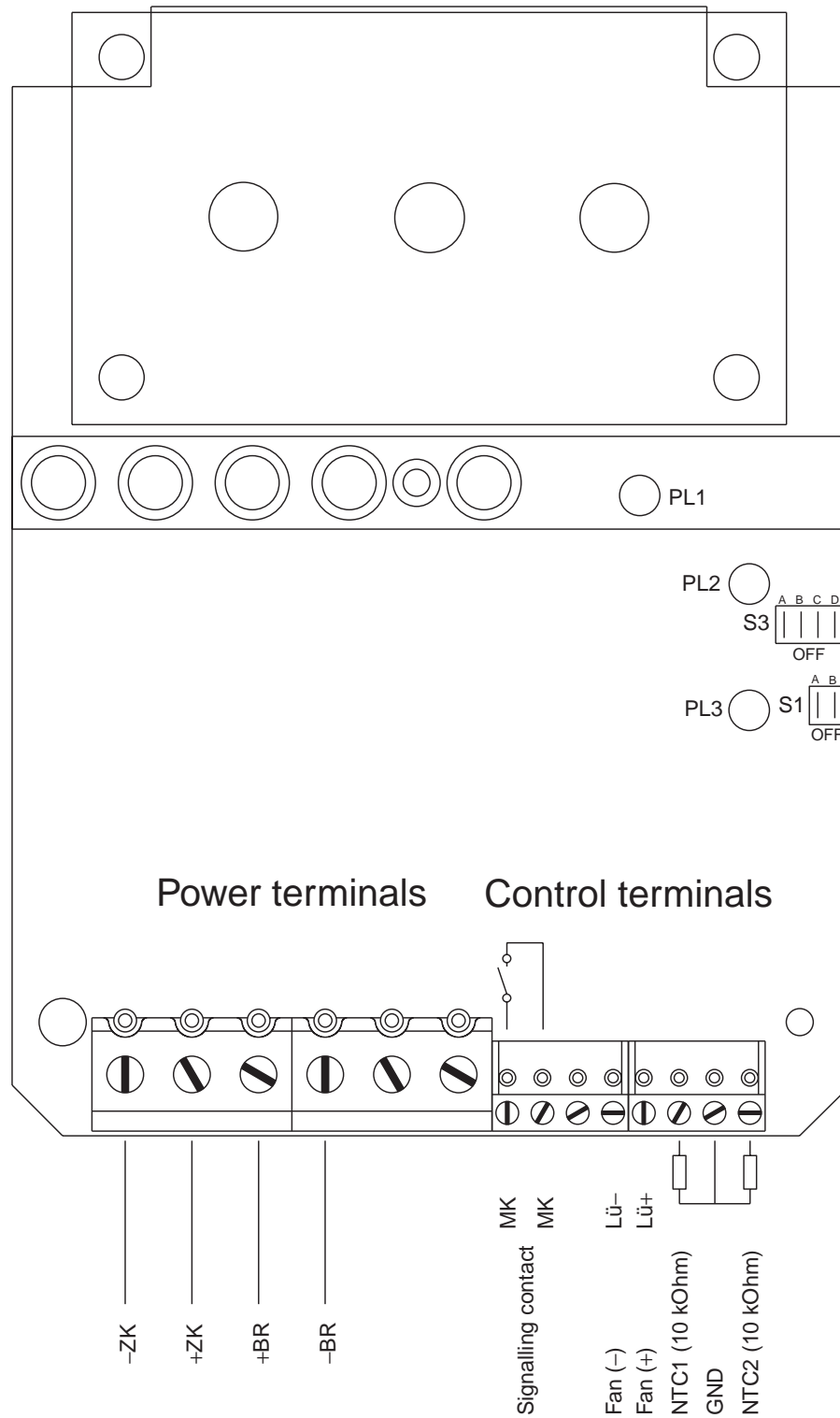
#### ATTENTION!

Wire the connection terminals for thermal protection (NTC) to the BC 200 so that the mains voltage is disconnected in the event of overheating of the braking resistor (use the signalling contact of the BC 200 for this).

#### NOTES:

- Depending on requirements, up to 4 braking resistors, each 20 Ω, can be operated in parallel with the BC 200. Monitoring with 2 NTC resistors is adequate. A BC 200 can power up to 2 fan pairs with a supply voltage of 24 VDC. An external power supply of 24 VDC may be necessary.
- Note the external fusing. If external fusing is required, please use the following fuses: Bussmann, mounting size equivalent to Neozed D01, E14. IP 54 fuse holders from Bussmann, Type: HEY-JJ-DLRC-J (available from BERGES).
- The connecting cable between inverter +/- and braking chopper may not exceed a length of 5 m. The cable must also be twisted.

## 2.4 Connection Terminal Assignment, Braking Chopper BC 200



- Adjustable electrical brake protection with switch S3:
  - S3A ON: Minimum protection.
  - S3B ON: Slightly higher protection.
  - S3D ON: High protection.
  - All switches OFF: No protection (maximum braking power; FACTORY DEFAULT SETTING).
  - All switches ON: Maximum protection (minimum braking power).
- NTC inputs  
(NTCs with the following characteristics should be connected):
  - 25 °C .... 10k.
  - 30 °C .... 7k8 Fan off.
  - 35 °C .... 6k4 Fan on.
  - 58 °C .... 2k4 Increased temperature.
  - 65 °C .... 1k8 Overtemperature signalling ON.
  - 58 °C .... 2k5 Overtemperature signalling OFF.
- NOTE:**  
If one of the two inputs is not used, a resistor with a rating of approx. 10 kΩ must be connected! The inputs may not remain disconnected!
- Operating state indicators:
  - POWER (PL1): DC link voltage applied.
  - BRAKE (PL2): Brake active.
  - WARNING (PL3): Signalling contact open (possible causes):
    - Increased temperature of the braking resistor; braking still possible.
    - Overtemperature; braking no longer possible.
    - Electrical brake protection active; braking no longer possible.
- Terminal designations:
  - +ZK: DC link voltage (from inverter), positive terminal.
  - ZK: DC link voltage (from inverter), negative terminal.
  - +BR: Braking resistor, positive.
  - BR: Braking resistor, negative.
  - MK: Signalling contact.
  - Lü–: Fan GND.
  - Lü+: Fan 24 V/1 A.
  - NTC1, NTC2: NTC terminals, each 10 kOhm (e.g. Siemens B57045).
  - GND
- Permanently adjustable values of the brake cut-in voltage  $U_{ZK}$  with switch S1:

S1A	S1B	$U_{ZK}$
OFF	OFF	760 V <sup>(1)</sup>
ON	OFF	730 V
OFF	ON	700 V
ON	ON	700 V

(1) FACTORY DEFAULT SETTING.





**BERGES**

**BERGES electronic GmbH**  
**Industriestraße 13 • D-51709 Marienheide-Rodt**  
**Postfach 1140 • D-51703 Marienheide**  
**Tel. (0 22 64) 17-0 • Fax (0 22 64) 1 71 26**

